An Evaluation of the Suitability of Air Force Operations and Maintenance Funding for Use in a Nomothetic Model

GRADUATE RESEARCH PROJECT

Jeff Daniel, Civilian, USAF
Certified Public Accountant
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DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY

AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

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Jeff Daniel, BBA
Certified Public Accountant
Civilian, USAF

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Jeff Daniel, BBA
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Approved:

_____	_____
William A. Cunningham, PhD	Date

ABSTRACT

The Department of Defense's Planning, Programming, Budgeting and Execution (PPBE) process provides the foundation for integrating mission requirements with limited resources. However, in doing so, it places a significant burden on financial management professionals frequently requiring that critical, skilled resources be occupied with creating documentation rather than in accomplishing higher level analysis.

It is possible that models could be used within the PPBE process to streamline the work done to provide estimates of needed resources. However, such a model would be valid only if it could be proved that the data used within the model was suitable for such purposes. A nomothetic model could potentially be the modeling framework but only if the source data met the model's three criteria.

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AN EVALUATION OF THE SUITABILITY OF AIR FORCE OPERATIONS AND MAINTENANCE FUNDING FOR USE IN A NOMOTHETIC MODEL

CHAPTER ONE

"I am pleased to join you as you consider proposals to change the entire budget process from an annual to a biennial cycle. This change has been advocated as a way to advance several objectives: …. (2) to shift the allocation of agency officials' time from the preparation of budgets and justifications to improved financial management and analysis of program effectiveness; …..…Currently, agency budget officers spend several months every year preparing a "from-the-ground-up" budget with voluminous written justifications."

Testimony to Congress by Susan J. Irving,
Associate Director, Federal Budget Issues
Accounting and Information Management Division
March 10, 2000

PLANNING, PROGRAMMING, BUDGETING AND EXECUTION

The Department of Defense (DoD) expends significant manpower on developing various financial plans. These plans are used for multiple purposes from prioritizing programs and risks associated with unfunded programs to providing justification and documentation to support the Department's input to the President's Budget.

Collectively this process is referred to as PPBE – Planning, Programming, Budgeting and Execution. Originally implemented by Secretary of Defense Robert McNamara, PPBE provides a system's analysis approach to building financial requirements. The specific components are:

- Planning – DoD analyzes threats to national security and develops appropriate strategies to prepare for and handle the threat. The planning phase provides the

broad framework in which the services are to accomplish the strategies. Planning is not resource constrained but provides input to subsequent actions in which resources are balanced with requirements.

- Programming - The individual services convert planning decisions and Congressional guidance into a detailed allocation of resources. Specifically, the services match their available resources against their requirements and submit program proposals. This process is normally resource constrained meaning that the amount of money each service shows as being spent for all of their programs equals the amount of money DoD told each service that they would probably receive. The primary document in this process is the Program Objective Memorandum (POM). Programming covers the six fiscal years following the next fiscal year.
- Budgeting – The budgeting phase creates the financial plan for the next fiscal year and is the phase that provides DoD's plan to execute the President's budget. It is a detailed review of a program's pricing, phasing, and overall capability to be executed on time and within budget.
- Execution – Execution encompasses all financial planning and spending within the current fiscal year. During execution, funds are allocated, obligated and expended to accomplish each service's plans. In addition, execution entails the rigorous monitoring and reporting of actual results and variances with anticipated results, along with causes of variances and planned corrective actions, if necessary.

PUBLIC LAW

All funds provided to the services are subject to various public law restrictions including one which defines the uses for which the money can be spent referred to as the purpose limitation.

Regarding the purpose limitation, public law states that "Appropriations shall be applied only to the objects for which the appropriations were made except as otherwise provided by law." (31 U.S.C. § 1301(a)). (Red Book I, 4-6) The purpose can be defined either very narrowly such as for the modification of a specific aircraft (frequently referred to as a line item appropriation) or very broadly such as for civilian pay (frequently referred to as a lump sum appropriation). (Red Book II, 6-5) The purpose is largely identified by the appropriation category in which the funds are made available. For instance, appropriation 3010 is used for the procurement of weapon systems and contains line item appropriations, and appropriation 3400 is used for broad purposes, is a lump sum appropriation, and is authorized by Congress in Budget Activity (BA) codes. The 3400 appropriation is referred to as Operations and Maintenance (O&M) funds and includes money for both payroll and non- payroll purposes. Within the Air Force, O&M funds are provided by Congress in four BAs:

- Budget Activity 01 (Operating Forces) - consists of Air Operations, Combat Related Operations, and Space Operations. These funds support fighter, bomber, and missile forces assigned to Air Force operational commands. (AF, 2)

- Budget Activity 02 (Mobilization) - includes Airlift Operations, Command, Control, Communications and Intelligence (C3I), Mobilization Preparedness, and related Base Operating Support and Facilities Sustainment. (AF, 3)
- Budget Activity 03 (Training and Recruiting) - supports three broad mission areas: Accession Training, Basic Skills and Advanced Training, and Recruiting & Other Training and Education. (AF, 4)
- Budget Activity 04 (Administration and Service-wide Activities) - funds four broad mission areas: Logistics Operations, Service Wide Support, Security Programs, and Support to Other Nations. (AF, 4)

In addition to legal restrictions on use such as the purpose limitation, other public laws establish additional framework which bound appropriated funds. For financial managers within the Federal government, one of the most notable of these laws is the Antideficiency Act which mandates that funds can't be used until Congress makes them available for use. (Red Book II, 6-34) Specifically, 31 U.S.C. § 1341(a)(1) states in part that:

"(a)(1) An officer or employee of the United States Government or of the District of Columbia government may not ….

"(B) involve either government in a contract or obligation for the payment of money before an appropriation is made unless authorized by law." (Red Book II, 6-38)

Simply put, the legal sequence of events requires that any use of the money such as establishing a contract occurs after the legal provision of the funds.

The PPBE process is managed by different corporate groups within the services. Within the Air Force command structure, the process is controlled by "panels" at both the Pentagon and commands. Each panel represents an amalgamation of logically associated programs. For instance, a single panel at a command could be the focal point for all mission support sustainment activities such as civil engineering, base operating support, base communications, and information technology.

PPBE CHARACTERISTICS OF DIFFERENT FUNDS

Line item appropriations are generally managed within the acquisition communities at product centers which have responsibility for buying specific categories of commodities. For instance, the Aeronautical Systems Center at Wright-Patterson Air Force Base is responsible for contracting for and acquiring airplanes. Staffs for these programs are centralized in program offices.

However, lump sum appropriations are frequently decentralized and managed in all of the many base organizations that sustain daily operations such as Base Communications Groups and Civil Engineering Groups.

Due to the life cycle of the acquisition programs and their prominence, acquisition programs offices are highly monitored at all level of the corporate structure and have highly trained, senior financial staffs. In addition, all PPBE documentation for these programs is supported by carefully documented comprehensive cost and schedule estimates created and reviewed by not only financial managers but also by program managers and engineers on the government's staff and on the contractor's staff. .

In contrast, lump sum appropriations tend to be managed by less senior staffs that have experience as group level business managers but far less technical cost/schedule training than their acquisition counterparts. This dichotomy in expertise as well as the nature of the goods and services being acquired result in cost estimates for O&M programs tending to have less credibility in terms of correlation to final financial requirements than acquisition programs. Finally, the nature of the O&M environment and the data systems that support it affords O&M managers more of an opportunity to "game" the PPBE process than that afforded acquisition managers. As a result, some major O&M programs within the Air Force have successfully operated for many years with only a small portion of the financial requirements input into PPBE as being their minimum funding requirement for survival.

FLOW OF FUNDS AND FUNDING RESTRICTIONS

After funds are approved by Congress through the appropriations process, they are allocated to the services and further allocated by the services to commands and by commands to various command panels and through those panels to subordinate organizations including centers, bases, and groups. In general, line item appropriations offer limited discretion for those in the distribution process. Specifically, since the purpose of the funds is very carefully defined, each stage of funding distribution lacks the authority to use the funds for alternate purposes. Such authority to use funds for purposes other than that for which they were appropriated is referred to as reprogramming. Most reprogramming of line item appropriations requires Congressional approval.

However, O&M funds offer significant authorized opportunities for alternate uses. This flexibility is provided through the broad nature of the BAs. For instance,

funds could have moved through the entire PPBE process as being intended for telecommunications hardware. However, the BA within which these funds were issued also supports many other activities such as civilian payroll. At any stage of the funding allocation process, it is totally legal to realign the money from the hardware to payroll – or to any other legitimate purpose within that BA. This realignment within BAs is at commanders' discretion, does not constitute a reprogramming and does not require Congressional approval. This flexibility is a valid authority of a commander at any level to appropriately react to changing circumstances and priorities. In addition, this flexibility allows commanders at any level to maintain stable operations across the full scope of their business operations even when funds for specific programs within those operations have been reduced. This authority to stabilize operations can be used to mitigate the unintended consequences of changing levels of funding.

CREDIBILITY OF LUMP SUM APPROPRIATIONS' PPBE ESTIMATES

As mentioned, large disconnects within O&M funds between PPBE estimates and actual results are common. Although such disconnects also occur in line item appropriations, those variances are more likely to be explained by programmatic changes such as revisions of schedules or the addition/elimination of technical requirements. When they occur, line item variances can be explained due to the availability of comprehensive databases that track program events and cost impacts in great detail. However, financial managers within the O&M environment lack that level of program content information, the data systems and the expertise to explain variances between plan and actual. Despite these limitations, the O&M financial staff is still required to create

voluminous data input for PPBE reports and records that are of limited value and frequently ignored.

For example, one Air Force command maintains a extensive database in which the programming phase of PPBE is accomplished. This database requires that staff at all levels of the command build detailed records for their financial requirements. These records contain narrative of what will be accomplished with funds provided as well as estimates of the funding needed. These estimates were made at two levels of funding - total requirements (TR) and acceptable risk requirements (ARR). TR was defined by the command as the full funding amount the program required to accomplish all identified tasks. ARR was defined by the command as the lowest possible level of funding with which the program could survive without having an unacceptably high risk of program failure.

Table 1
VARIANCE TO PLAN
($ in M's)

	FY	# Records	ARR	TR	Actual	%Act/ARR
PEC A	2006		$604.9	$883.6	$115.1	19%
	2007	1916	$601.4	$831.5	$111.6	18%
PEC B	2006		$197.3	$202.9	$165.3	84%
	2007	2284	$201.5	$206.1	$157.4	78%

(Data extracted from Air Force Material Command's programming database on April 8, 2008)

Table 1 is a summary for two major O&M categories (i.e. Program Element Codes or PECs) in that command and shows the number of records built for those categories, the documented funding levels at ARR and TR, and the actual funds obligated (i.e. placed on contract) in each of the fiscal years 2006 and 2007. The final column is

the actual funds provided each year divided by the ARR. Despite the manpower invested in creating records and the exhaustive series of reviews at each level of the corporate decision process, the documentation frequently does not reflected reality. As shown, significant variances existed in each fiscal year. For example, in one major category of funding (i.e. PEC A), the command only provided the bases 18% of the minimum survival amount of funding "required" in FY 2007 to avoid mission failure. Despite this apparent shortfall in minimum required funding, the commanders responsible for PEC A's execution consistently have rated their programs as "green" thereby indicating that the program was functioning at a high state of readiness.

Specifically, the command panel responsible for oversight of the programs funding by PEC A conducted an exhaustive review of those programs in 2007. The review included evaluations by technical experts located at the command and at the bases as well as the programs commanders' professional evaluation of status. Without exception, every program funded by PEC A was rated "green" at all of the command's bases. The "green" rating was the final summary evaluation indicating that each component of each program was performing at a mission capable level of performance and was accomplishing all the required tasks in a satisfactory manner. In other words, the bases got only 18% of the amount of funding they required to avoid mission failure yet were operating satisfactorily.

These variances between the extensively documented financial requirements and the actual amount of funds provided – even when the documentation is supposed to represent the absolute minimum financial requirement – have raised concerns on the credibility of the PPBE documentation and it's value added for the corporate process.

O&M FUNDS RESISTANCE TO CHANGE

The programmatic nature of line item appropriations as well as the nature of the contractual vehicles makes them open to dramatic funding changes. These changes can be the result of reduced funding or decisions to stop the program completely. These characteristics make line item appropriations suitable for "fine tuning" – discrete adjustments – throughout the PPBE cycle. O&M funds are different

Specifically, O&M funds are resistant to attempts to change funding patterns. This resistance is due to two related causes. First, as previously mentioned, O&M funds allow commanders the flexibility to legally adjust funding levels between PECs within BAs. This ability allows commanders the opportunity to stabilize programs from unintended funding fluctuations. However, it also allows commanders the opportunity to stifle intentional attempts to eliminate or to modify on going programs. Second, O&M funds pay for day to day support of the infrastructure and such infrastructure overall is an intrinsically more stable environment than procurement actions.

OBJECTIVE

If O&M funds are resistant to change, it should be possible to demonstrate that characteristic through analysis. Concurrently, since PPBE estimates and actual spending significantly diverge, it is possible that the analysis could provide a basis for accomplishing PPBE actions in a more effective manner than record-by-record construction of PPBE documentation. Therefore, the objective of this paper is to evaluate the suitability of Air Force O&M funds for use in a nomothetic model. A nomothetic

model is a model of causality with three specific criteria. The model and those criteria are discussed in Chapter 2.

To that end, this paper evaluated financial obligation trends for the two sources of funds (i.e. PECs) identified in Table 1 at the nine largest bases within the Air Force Material Command. The financial data used was from the official Air Force accounting records from Fiscal Year 2001 through Fiscal Year 2007 and reflects the final obligations for that fiscal year. An obligation is recorded in the accounting records when a legally binding contract for specific goods and services has been awarded by the government. The financial information was analyzed to determine any relationship between total command non-payroll funding provided to the nine bases for each PEC and incremental funding by PEC at each of the nine bases.

Although the data used was from official records, the analysis had three embedded limitations. First, the obligations shown for a specific program potentially does not fully identify everything that was spent on that program. This limitation is due to the previously discussed flexibility of the use in lump sum appropriations. Specifically, a base commander could legitimately decide to realign money within a BA from one program to another. However, the accounting documentation for the changed use of funds could retain the accounting classifications of the first program.

Second, the accounting data shown potentially does not reflect the final use of the money. This limitation is due to the legal ability (within clearly defined bounds) to take unused money off of a contract for up to six years after award and use it for another program.

Third, the Air Force's financial accounting systems are archaic and meant more for accounting to Congress on the use of appropriations than for management analysis. Even for experts, changes within accounting systems (e.g. changes in accounting codes for different locations) and tracking of records to specific programs are exceptionally challenging. This could potentially cause unintended anomalies in the accumulation of data and the analysis of transactions.

As suggested above, O&M funding levels are resistant to change. This resistance to change does not mean that funding levels from year to year do not themselves change. It is the author's hypothesis that change can be explained at the macro level in a quantitatively definable and consistent relationship between total funding and the funding the various organization receive. Further, if such a definable relationship can be shown, outliers from that defined relationship should represent significant, non-routine programmatic changes within the appropriation.

If the hypothesis is supported by analysis, it could have implications on both the appropriate use of manpower in the PPBE process and the overall purpose of PPBE itself. Specifically, PPBE could potentially be streamlined with critical manpower aligned against higher level of analysis duties and the focus could be clarified to be more of a program content definition and prioritization process and less of a funding allocation process. Finally, it would demonstrate that such an analysis could potentially be accomplished at command and Air Force levels with the result being a valuable management tool that could quickly provide predicted levels of funding execution for individual programs at specific bases. This tool would release valuable manpower from the intensive process of building detailed records. Instead, the manpower could be

utilized for more exhaustive analysis of trends, and the identification of and the cost analysis for significant, non-routine programmatic changes within the appropriation that themselves are the future variances to predicted financial execution levels.

CAVEAT: Financial execution information provides critical insight into Air Force operations when linked to the location where the funds are used and the specific programs on which they are used. To avoid the release of program insight to those not authorized to view it and to avoid raising unintended questions against the decision makers that manage these funds, the specific purpose – referred to as the Program Element Code or PEC - will be masked as previously indicated throughout the paper and referred to only as PEC A and PEC B. Despite this masking, the PECs analyzed are for routine O&M type activities common throughout the Air Force.

CHAPTER 2

DATA ACCUMULATION

As previously stated, this paper utilized the final obligations in the Air Force's official accounting records for the Fiscal Years 2001 – 2007. Although these were official records, they did not present themselves in a manner easily suitable for analysis. For example, reorganizations within the Air Force occur frequently. As the reorganizations occur, accounting codes representing the new organization frequently are changed to distinguish it from the old organization. When such changes are made, the accounting records do not provide an easy trail to track financial events at a specific geographical location when the identifying codes have changed. As a result of challenges such as this, significant effort was required to manually extract and accumulate financial data for specific bases to provide the data suitable for analysis.

NOMOTHETIC MODEL

Financial data in the Air Force presents itself as a flood of numbers within the accounting system. For example, the final Air Force accounting records for Fiscal Year 2006 contained almost 6,300 line items of obligations. Each of these obligations were in turn supported tens to thousands of individual transactions recording contracts, purchase requests, changes in stages of accounting, or adjustments of accounting records. In raw form, this accounting information is of marginal value to any manager that is required to make future decisions using past events as one of the evaluating criteria. If it were possible to extract valid trends from this information, the usability of the data would be significantly enhanced not only as a descriptive tool of past events to be used as a

baseline against which decisions could be evaluated but potentially as a predictive tool of future events to be used to support decision making.

To those ends, this project evaluated financial data to determine it's suitability for use in a model that describes past events. Such a model would define relationships between total funding in specific categories and subordinate funding at different locations and for different uses. This project was not intended to answer any question related to effectiveness of the utilization of available resources. Specifically, any proven model would describe what was done not what should have been done. However, the model – if proven - would provide a useful tool in various PPBE scenarios to establish a baseline of past events against which to evaluate planned future actions. For instance, managers are frequently required to provide input to various financial "drills" such as "If your total funding in the next Fiscal Year were 95% of X as opposed to the X we originally told you that you would receive, how would you distribute it among the different programs and to the different bases?". At present, these responses are based largely on professional judgment founded on the level of experience the manager has with those specific programs at those specific locations. If a model were established that showed a statistically valid relationship between an independent variable (in this case total funding) and dependent variables (in this case incremental funding for specific programs and specific bases), the manager could either use that model to provide a reasonable response or could use that model to evaluate staff recommendations.

The proposed model was nomothetic in nature. In nomothetic models, the goal is to "find common influences that explain a general class of .. events". (Ruane, 76) Specifically, the model would explain the causal relationship between how much money

was spent at specific places and for specific purposes to total funding spent for the same purposes across the entire command. As Babbie noted (Babbie, 100), an nomothetic model is valid only if it meets three criteria:

1. Correlation
2. Time order
3. Nonspurious

Correlation is the relationship between the variables (i.e. total funding and subordinate funding). If there is a correlation then the changes in one variable (i.e. subordinate funding) will be associated with a change in the other variable (i.e. total funding). (Babbie, 100) To test correlation, the author utilized MiniTab, a commercial software package, to perform regression analysis to evaluate the relationship between the variables. For each set of data, multiple tests were run including simple linear regression and more complex analysis such as quadratic, cubic and logarithmic regression.

Time order is the sequential relationship between the variables. In this project, total available funding is the "cause" and subordinate funding is the "effect". For a casual relationship to exist and any model to be valid, the cause needs to come before the effect. (Babbie, 100) As discussed in Chapter 1, multiple actions including initial distribution of funds and subsequent adjustments contribute to final funding totals. In addition, by public law, funding availability precedes any use of funding. Therefore, this criteria is met *defacto*.

The nonspurious criteria for a nomothetic model requires that the relationship between the two variables can not be explained by a third variable. (Babbie, 100). Multiple events (i.e. variables) can have an impact on the amount any location spends for

a specific purpose. These events include corporate decisions on mission, changes in specific contracts, and changes in manpower levels. However, since use of funds for specific purposes is one of the foundations for financial management established in public law (i.e. the purpose limitation), this criteria was met defacto.

Therefore, the primary purpose of this project will be to focus on the causality criteria of nomothetic models.

REGRESSION ANALYSIS

Two types of sub-categories of models need to be considered. The first is a deterministic model. In a deterministic model, it would be possible to predict the exact relationship between total funding and subordinate funding. (McClave, 598) A review of accounting data indicates that except for the most simple of situations this relationship does not exist. Plainly stated there are variations in levels of subordinate funding every year. However, there is another option – a model that takes into account those variations.

A probabilistic model, contains both the deterministic portion of a relationship as well as the variations. (McClave, 598) In a probabilistic model, a formula can be developed that best expresses the relationship of data and that formula can be tested to determine if it is statistically valid. Testing for the causality criteria of the nomothetic model utilized regression analysis. In it's most simple form, the regression analysis would result in the formula for a straight line such as "Y = a + bX" where "a" is the y-intercept (i.e. the predicted value of "Y" when "X" equals zero) and "b" represents the slope of the line (i.e. the change in "Y" for every single unit change in "X"). In this paper, total funding is "X" and represents the independent variable, and "Y" is the subordinate funding and represents the dependent variable. As a prelude to subsequent

analysis in this paper, it is important to note 1) that the y-intercept is not meaningful if either the value of "X" is nonsensical or if the intercept itself is outside of the range of the data being tested and 2) that the slope itself is relevant only within the range of the data being evaluated. (McClave, 607)

Three evaluation measures – two quantitative and one subjective - were used to test the validity and usefulness of the formula developed to describe the potential model. Concerning the quantitative measures, the first was a calculation referred to the p-value and the second a calculation referred to as adjusted R squared.

P-values, also known as the observed level of significance, is " the probability … of observing a value of the test statistic that is at least as contradictory to the null hypothesis, and as supportive of the alternative hypothesis, as the actual one computed from the sample data." (McClave, 360) More simply stated, the data being tested will have a mean (i.e. an average value) and the predictive formula will also have a mean. Through testing, a determination will be made either that the means are different, or they are the same with any differences due to random sampling. The p-value is expressed as a value between 0 and 1 representing 0 to 100% and is judgmentally established prior to testing. For the purposes of this paper, a baseline p-value of .05 was established as the evaluation standard. If a p-value of .05 is returned by the testing, it means that there is only a 5% chance of observing differences from the two means even if they are identical. As a result of establishing this baseline, any test that returned a p-value equal to or less than .05 was deemed statistically significant. Conversely, any test that returned a p-value greater than .05 was deemed statistically insignificant.

Adjusted R squared represents the proportion of variances around an average of the test data that is explained by the formula. In practical terms, an adjusted R squared of 90 means that 90% of the variances can be explained by using X to predict Y. (McClave 634 and 678).

The third evaluation measure was the percentage variation around the mean. Specifically, when the formula is applied, it results in a predicted value and this predicted value can be compared to the actual value. The difference between the predicted value and the actual value is a difference that will be evaluated subjectively. Although not as founded in statistics as p-value and adjusted R squared, this percentage difference around the mean is potentially of greater interest to Air Force financial managers. In practical, easily grasped terms, it allows for a quick look at the suitability of use for predicted relationships.

CRITICISM OF PPBE

In theory, PPBE offers the ability to define financial requirements, compare the need for those requirements against all requirements competing for resources, prioritize all of the requirements, and define the risks associated with not providing resources for a portion or all of the various requirements. This process generally begins with a higher organization (e.g. the Secretariat of the Air Force or one of the commands) assigning an expected funding amount – referred to as a target or as a bogey - to a subordinate organization. This process begins at the top of the hierarchy and continues until a final target is assigned to the lowest organization within the hierarchy. At each stage of assignment, an organization frequently pulls money out of the total amount for its own purposes and then allocates the balance down the chain of hierarchy. Then, each

organization within the hierarchy builds documentation in great detail to describe what they plan on doing with the assigned funds and what the risks are for not taking the proposed action. As the documentation is developed within a tightly defined schedule of events, it is pulled back up the hierarchical chain for evaluation and subsequent accumulation with documentation from all subordinate organizations. As noted by the GAO at the start of Chapter 1, this effort requires an extensive investment of manpower and a "voluminous" amount of documentation. The manpower is expended by staff at every level of the organization in creating the documentation and by senior management in reviewing and approving the documentation.

PPBE has been criticized since its implementation within the Department of Defense in the 1960s. This criticism includes academic criticism that PPBE's managerial engineering approach is ineffective and oversold. (Paparone, 40) Significantly more, non-academic criticism comes from those practitioners that either manage the process or those whose recurring activities are impacted by the results. This practitioner criticism frequently focuses on the question of value added from all the work especially in those environments where the excessive work results in the same outcome year after year. As discussed in Chapter 1, outcomes of PPBE largely depend on the type of activity. Those activities that are subject to clearly defined outcomes with distinct alternatives in deliverables arguably benefit from the rigor of PPBE. Such an activity could include acquisition of a major weapon system. The acquisition itself is supported by highly refined cost estimates and is categorized by numerous activities (e.g. installing a modification, having a sub-assembly delivered) that can frequently be accelerated, curtailed, or cancelled within the context of the overall schedule for delivering the

weapon. With these characteristics, PPBE activities have significant value and the outcomes (i.e. financial resources provided) can vary significantly year to year based on the decision related to the multiple subordinate activities.

The operations and maintenance environment is different. Specifically, O&M funds pay for the daily operations of the Air Force such as communications and base operating support. In the authors opinion, this environment lacks both the highly refined cost estimates of acquisition but also is more stable and less subject to wide fluctuations in requirements as the acquisition environment. For example, the President could chose to completely cancel an acquisition program. Absent any contractual liability associated with the cancelation, all financial resources previously targeted to the program would be immediately available for other uses with limited disruption of the Air Force's daily activities. However, a decision to eliminate or even significantly reduce telephone operations would not be realistic absent a decision to curtail other activities (e.g. reduce manpower, close a base). This "continuing activity" characteristic of O&M adds to the non-academic criticisms of PPBE. Simply put, if the end result is the same, why all of the effort? Further, if the effort is of limited value, couldn't the highly skilled and experienced personnel that staff the O&M PPBE process be better utilized in other functions? However, most importantly for this paper, if analytical methods can produce a result (i.e. financial resource targets) reasonably close to the manpower intensive process, wouldn't the overall management process be enhanced by utilizing such tools?

CHAPTER 3

Based on the analysis of total fiscal year end obligations from FY 2001 – FY 2007 at command and base level for two Program Element Codes at the Air Force Material Command's nine largest bases, Air Force Operations and Maintenance Funds are suitable for use in a nomothetic model.

TIME ORDER

Time order is the sequential relationship between the variables. In this project, total available funding is the "cause" and subordinate funding is the "effect". For a casual relationship to exist and any model to be valid, the cause needs to come before the effect. (Babbie, 100) Since the Anti-Deficiency Act mandates that no obligation can be made before the funds become available, it follows that the cause (i.e. total funding being made available) proceeds all the subsequent actions of placing the funds on contract as reflected in the funding recorded in the Air Force's accounting records as obligations. Therefore, the time order criterion for a nomothetic model was met since the cause and effect variables have a sequential relationship.

NONSPURIOUS

As previously stated, the nonspurious criteria for a nomothetic model requires that the relationship between the two variables can not be explained by a third variable. (Babbie, 100). In the classic example of a spurious relationship, it can be demonstrated that there is a high correlation between foot size and math scores. However, the relationship is not actually between those two variables but rather the relationship exists with a third variable. Specifically, the third variable is a person's age. As people age,

they generally have increases in the size of their feet. However, as people age, they also tend to progress through school and the associated math courses. Therefore, the correlations among the variables are age to foot size and age to math scores not as originally proposed foot size to math scores. Since the spending is restricted by the purpose limitations of appropriation law, a nonspurious correlation exists between the uses of funds and the purpose for which those funds were spent.

CORRELATION - STATISTICAL

Regression analysis was performed on the cause of total command obligations (i.e. the independent variable) and the effects of individual base obligations (i.e. the dependent variables) for the purpose of determining if a quantitatively definable, statistically valid relationship could be demonstrated.

The regression was run in multiple modes such as linear with an intercept, quadratic, cubic and logarithmic. In these, many of the tests yielded results in which the statistical measures were outside of acceptable tolerances with linear regressions with an intercept most frequently coming closest to affirming a relationship. As the test results were independently reviewed, it was noted that the Y-intercept was a limiting and irrelevant data point. For example, numerous tests resulted in formula that indicated if total command funding was zero then the bases owed the command money (i.e. the Y-intercept had a negative value). In addition, no conceivable situation would ever result in the command receiving zero funding for the day to day work funds by the two PECs. Therefore, the value represented by the Y intercept made no sense. In addition, the Y-intercept always was a value outside of the range of data evaluated. As noted in Chapter 2, the Y-intercept is not meaningful if either the value of "X" is nonsensical or if the

intercept itself is outside of the range of the data being tested. Finally, the slope itself is relevant only within the range of the data being evaluated. (McClave, 607). Therefore, all regressions were reworked as linear formula without a Y-intercept. In other words, any resulting formula would be expressed as a simple formula as in X = .25Y where the total fiscal year end obligations at base X were equal to 25% of the total command obligations with a variance/residual in dollars obligated around the mean of predicted obligations such that "Residual = Actual obligations in year 1 – Predicted obligations in year 1". The original data, final regression equations, tests conducted and final results are presented in Appendices 1 for PEC A and 2 for PEC B, and summarized below.

Table 2
Summary of Results
PECs A and B

	PEC A			PEC B		
	Coef	AdjR	P	Coef	AdjR	P
Brooks	.0644	90.29	.0000	.0451	81.60	.0010
Edwards	.0532	85.10	.0010	.1296	97.65	.0000
Eglin	.0603	83.08	.0010	.1117	97.29	.0000
Hanscom	.1585	99.22	.0000	.0464	99.13	.0000
Hill	.0766	88.78	.0000	.0776	99.85	.0000
Kirtland	.1356	91.56	.0000	.0867	99.84	.0000
Robins	.0804	95.97	.0000	.1164	99.33	.0000
Tinker	.1317	97.61	.0000	.1575	97.78	.0000
WPAFB	.2391	99.31	.0000	.2287	98.18	.0000

In the table above, “Coef” is the coefficient (i.e. the slope) of each base’s predictive formula such that a base’s obligations for any year equal the coefficient multiplied by the total obligations for the nine bases in that year. Simply, the coefficient is the percentage of total command funding allocated to the base. The other columns are the adjusted R squared and p values for that predictive relationship. The results of these tests (i.e. the predictive formula) were evaluated to determine the validity of the relationship with final emphasis being given to the p-values and the adjusted R squared values.

The p-value is an indicator of the statistical significance of the predicted relationships with values equal to or less than .05 being statistically significant and those greater than .05 being statistically insignificant. In all, 18 relationship were evaluated for the seven fiscal years with each combination of command total obligations and nine bases’ total obligations for the two PECs comprising the 18. In everyone of the 18 tests, a p-value was returned of less than .05. As a result, every predicted relationship was deemed statistically significant.

The adjusted R squared represents the proportion of variances around an average of the test data that is explained by the formula. In practical terms, an adjusted R squared of 90 means that 90% of the variances can be explained by using X to predict Y. (McClave 634 and 678).

In every instance of testing without a Y-intercept, each regression formula for base/PEC resulted in an adjusted R squared value that indicated that the predicted relationship explained a very high percentages of variances around the mean.

For PEC A, the lowest adjusted R squared was 83.08% at Eglin and the highest was 99.31% at Wright-Patterson. For PEC B, the lowest adjusted R squared was 81.60% at Brooks and the highest was 99.85% at Hill.

As a result, the quantitative tests on the relationships confirm that there is a quantitatively definable, statistically valid relationship from FY 2001 – FY 2007 between total command obligations in PECs A and B and base level obligations in the same PECs at Air Force Material Command's nine largest bases. Further, the correlation criteria for the nomothetic model was met.

CORRELATION - SUBJECTIVE

Despite the statistical validity of the predicted relationships, the question of working relevance remains. To address this, differences were calculated from the actual obligations at each base for every year in each of the PECs (i.e. Predicted Obligations = Formula Coefficient * Total Command Funding; Difference = Actual Obligations – Predicted Obligations). Those differences were reduced to a percentage by dividing the difference by the actual obligations and then converting the =/- values to an absolute value (i.e. % Difference = Difference/Actual Obligations). The results shows in practical terms how widely the predicted value varies from the actual value. The results of the % difference analysis are presented below in Table 3.

For PEC A, the highest percentage variance of 128.28% occurred at Brooks in 2003. In this instance, the regression formula predicted that that Brooks would obligate 6.43% or $5,317,106 of the total command obligations. However, their total obligations for 2003 totaled only $2,329,182. For PEC A, the lowest percentage variance of 0.13% occurred at Hill also in 2003. In this instance, the regression formula predicted that Hill

would obligate 7.66% or $6,332,453 of the total command obligations. Their actual obligations for that year were $6,324,271.

For PEC B, the highest percentage variance of 118.70% occurred at Brooks in 2007. In this instance, the regression formula predicted that that Brooks would obligate 4.51% or $6,219,181 of the total command obligations. However, their total obligations for 2007 totaled only $2,843,663. For PEC B, the lowest percentage variance of 0.12% occurred at Edwards in 2001. In this instance, the regression formula predicted that Edwards would obligate 0.12% or $19,020,377 of the total command obligations. Their actual obligations for that year were $18,997,655.

Table 3
Difference Ranges
PECs A and B

	% Difference/Actual Obligation					
	PEC A			PEC B		
Base	Lowest	Highest	Average	Lowest	Highest	Average
Brooks	5.54	-128.28	-13.58	10.26	-118.70	-28.98
Edwards	-8.79	54.10	-11.71	0.12	25.89	0.20
Eglin	9.10	49.92	-10.10	-3.81	-30.84	-4.25
Hanscom	-1.37	-13.28	-1.31	2.58	-15.47	0.51
Hill	-0.13	-75.09	-10.17	0.47	-5.49	0.03
Kirtland	2.22	37.79	-6.75	1.44	-6.98	-0.10
Robins	-0.21	27.34	-2.55	-0.36	13.17	-0.80
Tinker	1.32	-24.50	-2.37	0.14	-22.29	0.14
WPAFB	1.69	-20.14	-0.83	-7.10	-23.43	-3.18
Overall	-0.13	-128.28	-6.60	0.12	118.70	-4.05

Whereas absolute values of percentage variance express the difference from the mean regardless of that difference being higher than the predicted value or lower,

returning the sign value to the variance expresses the impact to the base with a negative variance meaning that the base would have obligated more than it actually did had the predictive formula been utilized. This variance also allows a focus on the original issue raised in the opening referenced GAO quotation that ".. agency budget officers spend several months every year preparing a "from-the-ground-up" budget with voluminous written justifications." To what end was all that work accomplished? More specifically, thousands of hours of manpower were used at base, center and command levels from FY 2001 to FY 2007 for the two PECs tested. What was gained from all of that effort as opposed to what could have been gained from utilizing a predictive model? For Hanscom, the predictive model would have resulted in total obligations for the seven years only 1.31% more than the amount actually obligated in PEC A. For Wright-Patterson, , the predictive model would have resulted in total obligations for the seven years only 3.18% more than the amount actually obligated in PEC A. As noted above, variances swing significantly over the course of the years. However, in the macro sense, the positive and negative variances ameliorate those swings over time. In aggregate for all the bases in all the years, the predictive model would have resulted in a cumulative total obligations across the command than were 6.60% higher than actuals for PEC A and 4.05% higher than actuals for PEC B.

SUMMARY OF FINDINGS

The genesis of this research occurred in the office of a senior executive service member immediately following one of the command's larger panel's work on the Fiscal Year 2008 Program Objective Memorandum. Upon the exit of the briefing staff, the executive asked his deputy and the author – then the chief of that panel's financial

resources – to stay behind. Reflecting on the extensive effort up to that point to create the panel's POM position, the remaining corporate briefings and negotiations, and the results, the executive questioned if the work had resulted in any significant additional insight. Glancing at the documentation before him detailing the historical funding levels, he commented that it appeared that funding levels were remarkably stable and that all of the work appeared to him to produce the same result year after year. From the analysis accomplished in this research, he was correct. However, he was correct neither in the sense in which he made the comments nor in the sense in which the author undertook this research.

The anticipated result of this research was that a model could be developed to be utilized to make funding allocation decisions. It is the author's conclusion that such a predictive budgeting model became exceptionally problematic in 1996.

Specifically, the GAO issued a ruling (B-259274, "Funding of Maintenance Contract Extending Beyond Fiscal Year") on May 22, 1996 that changed the business processes of the Air Force in regards to O&M funding. Prior to this ruling, Air Force business processes had included restrictive business practices in which funding for O&M funded contracts was generally cut off at the end of each calendar year. (GAO, 2) Specifically, financial managers were required to make a decision concerning whether each contract was either severable or non-severable.

Assume two contracts both for copy machine maintenance; one of which charged $12,000 for 12 months of service without regard to the number of repair visits or when the visits were accomplished and another which charged $12,000 in increments of $1,000 per month for a defined set of monthly services. Under pre-1996 business rules, the first

contract would be considered non-severable and the second severable since it's deliverables were distinct and could be cut-off (i.e. severed) at the end of a month. If the severable contract had a start date of August 1, current year O&M funds could only be used to pay for August and September services, the current year funding was then "severed", and new funding using the next fiscal year's funds were then used for the remaining 10 months of the contract that extended into the next fiscal year. Due to the burden of making such decisions and taking such actions, it was common in the Air Force for new contracts to have start dates of October 1 to allow a full 12 months of performance in a single fiscal year. As a result, funding for any single year tended to be more stable and predictable.

The GAO ruling stated that the Air Force had misread previous rulings and had been operating with unnecessary restrictions, and that:

> "1. Section 2410a of title 10, U.S. Code, provides that funds appropriated to Department of Defense for a fiscal year are available for payments under maintenance contracts for 12 months beginning at any time during the fiscal year. Kelly Air Force Base may award two vehicle maintenance contracts charging fiscal year 1994 money for each contract so long as each contract is properly awarded in fiscal year 1994 and each contract does not exceed 12 months in duration.
>
> 2. Section 2410a of title 10, U.S. Code, is a statutory exception to the bona fide needs rule. The statute authorizes the Department of Defense to use current fiscal year budget authority to finance a severable service contract for equipment maintenance that continues into the next fiscal year.
>
> 3. Air Force decision to leave 8 months of a 12-month severable service contract unfunded at the time of award does not violate the Antideficiency Act because of Availability of Funds clause in the contract. Nor did the Air Force decision violate the bona fide needs rule, because severable services contracts are funded out of funds current at the time services are provided unless otherwise authorized by law." (GAO, 1)

The result of the ruling was that management of O&M funds became more flexible since O&M funds could now be used to pay for services that crossed fiscal year lines. Consider the previous copy machine example. In that example, an analyst

reviewing program execution would see $12,000 obligated in each year of the contract's performance and would be able to predict future funding requirements. Under the new ruling, that became more difficult. Assume a situation in which funding shortfalls required that the contract only be funded through September 30 (i.e. paid for only August and September services). The financial manager would be required to immediately use new fiscal year money on October 1 to keep the contract in effect thus using 10 months/$10,000 dollars to pay for the existing option period on the contract. Assume a funding wind-fall in the second year and that the financial manager had enough money (i.e. $12,000) to pay for the entire 12 month performance period commencing on August 1 of year 2.

Prior to 1996, an analyst would have seen $12,000 in obligations in every year of the contract's performance. However, in the example just presented, the analysts could see as little as $2,000 for August and September in any one year and as much as $22,000 in any other year. Trying to cipher these obligations without intimate knowledge of the specific program would not be possible.

This ruling which resulted in contracts being written to "straddle" fiscal year boundaries gave much needed flexibility to financial managers but made modeling of such actions difficult. The result was the fluctuations seen in the regression analysis performed on the funding with specific fiscal year obligations fluctuating significantly (but within statistically acceptable bounds) around the mean.

If the regression analysis relations were quantitatively definable and statistically relevant as stated previously but the result does not indicate obligation stability, what exactly do the test results indicate?

Behind all of the obligations are contracts which defined requirements or needs that will be achieved when the contract is performed. In a sense, the obligations are a penumbra, a shadow of the requirements. Although the analysis demonstrated that the obligation data is suited for use in a nomothetic model and the subjective evaluation determined that the model – as it stands now - was not a predictive funding distribution model, what was clearly shown was that the underlying contractual contracts were themselves stable and that the model could be used to discern these stable requirements. In addition, the variations were an indication that financial managers were constantly "chasing their tails' by borrowing from one location to pay for contracts and then having to pay that location back in the subsequent year.

The predictive nature of underlying requirements demonstrated by this paper allows financial managers to create "need" baselines to evaluate documented PPBE requirements from bases and to use that baseline to reconcile carried over funding with current fiscal year needs.

CHAPTER 4

RECOMMENDATION

Financial management within the Federal government is a difficult undertaking in light of changing public laws, reprioritization of programs, and the dynamic nature of funding created by contingency requirements. As a result of this and the burden of work required under the PPBE process, financial managers need tools to allow them to make sense of a large amount of seemingly unrelated data. Such a tool could include a nomothetic model embedded within the financial management systems of the Air Force.

To be valuable, the tool would need to be able to automatically accumulate relevant data for analysis – a process that was manual and cumbersome for this project. At present, the Air Force is building an Enterprise Resource Program which includes an new accounting system named DEAMS (Defense Enterprise Accounting and Management System). One of the key objectives of DEAMS is to ”Produce and interpret relevant, accurate and timely financial information that is readily available for analyses and decision making.” (DEAMS, 1) It would be highly productive for financial managers if DEAMS was able to create baseline requirements information for use in the PPBE process.

Absent a systemic modification and a change in DoD’s PPBE processes, a financial manager must continue to create understanding and legitimacy of financial data within existing constraints. At a very practical level, the conclusions of this paper provide a tool to accomplish that task. It is possible to develop quantifiable relationships at each level of the PPBE process. Such relationships will not be considered an

acceptable substitute for detailed records in an environment of “document and defend”. However, they can add value as an evaluative tool to determine the reasonableness of requests for financial resources. Further, nomothetic models within the PPBE process could add a quick turn capability to center and command level financial managers when responding to the numerous “what if” scenarios from higher headquarters.

FURTHER RESEARCH

The value of recommended DEAMS PPBE modules would be strengthened through additional research including a broader sets of PECs at other commands. This research could potentially provide DEAMS developers with insight into methodology for accumulating data and for the specific PPBE objectives to be met with the new analytical suite. In addition, it is critical that the programming and financial accounting community – now separated by organization and purpose – be systemically and programmatically linked to avoid duplication of effort in meeting their individual PPBE tasks. Value stream mapping – a technique more common in industrial situations than in the service sector – could be employed to evaluate the value added for each step of PPBE and to identify the waste created by the endless requests for documentation and justification.

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APPENDIX A
PEC A
REGRESSION ANALYSIS

BROOKS		The regression equation is	Brooks = .0644FY Total						
Predictor		Coef	SE Coef	T	P				
FY Total		0.064354	0.007794	8.26	0.0000				
S	=	$1,638,844							
		Analysis of Variance							
Source	DF	SS	MS	F	P		R sq	91.91%	
Regression	1	1.8313E+14	1.8313E+14	68.18	0.0000		Adj R sq	90.29%	
Residual error	6	1.6115E+13	2.6858E+12						
Total	7	1.9924E+14							
	FY	FY Total Command Obs	BROOKS	Fit	SE Fit	Residual	St Resid	% var	Abs Var
	2001	$82,864,244	$5,645,293	$5,332,655	$645,809	$312,638	0.21	5.54%	5.54%
	2002	$73,131,719	$5,582,015	$4,706,327	$569,958	$875,688	0.57	15.69%	15.69%
	2003	$82,622,624	$2,329,182	$5,317,106	$643,926	-$2,987,924	-1.98	128.28%	128.28%
	2004	$78,743,748	$6,910,998	$5,067,484	$613,696	$1,843,514	1.21	26.68%	26.68%
	2005	$76,269,048	$3,535,794	$4,908,227	$594,409	-$1,372,433	-0.90	-38.82%	38.82%
	2006	$81,757,504	$6,056,041	$5,261,432	$637,184	$794,609	0.53	13.12%	13.12%
	2007	$80,468,442	$5,818,066	$5,178,476	$627,137	$639,590	0.42	10.99%	10.99%
			$5,125,341					-13.58%	34.16%

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EDWARDS		The regression equation is	Edwards = ..0532FY Total						
Predictor		Coef	SE Coef	T	P				
FY	Total	0.053212	0.008179	6.51	0.0010				
S	=	$1,719,953							
	Analysis of Variance								
Source	DF	SS	MS	F	P		R sq	87.58%	
Regression	1	1.2520E+14	1.2520E+14	42.32	0.0010		Adj R sq	85.10%	
Residual error	6	1.7749E+13	2.9582E+12						
Total	7	1.4295E+14							
	FY	FY Total Command Obs	EDWARDS	Fit	SE Fit	Residual	St Resid	% var	Abs Var
	2001	$82,864,244	$4,053,041	$4,409,360	$677,771	-$356,319	-0.23	-8.79%	8.79%
	2002	$73,131,719	$5,010,991	$3,891,474	$598,166	$1,119,517	0.69	22.34%	22.34%
	2003	$82,622,624	$7,771,222	$4,396,503	$675,795	$3,374,719	2.13R	43.43%	43.43%
	2004	$78,743,748	$3,778,187	$4,190,100	$644,068	-$411,913	-0.26	-10.90%	10.90%
	2005	$76,269,048	$2,863,089	$4,058,417	$623,827	-$1,195,328	-0.75	-41.75%	41.75%
	2006	$81,757,504	$3,291,140	$4,350,468	$668,719	-$1,059,328	-0.67	-32.19%	32.19%
	2007	$80,468,442	$2,778,626	$4,281,875	$658,175	-$1,503,249	-0.95	-54.10%	54.10%
			$4,220,899					-11.71%	30.50%

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EGLIN		The regression equation is	Eglin = ..0603FY Total						
Predictor		Coef	SE Coef	T	P				
FY	Total	0.060295	0.009973	6.05	0.0010				
S	=	$2,097,151							
		Analysis of Variance							
Source	DF	SS	MS	F	P		R sq	85.90%	
Regression	1	1.6076E+14	1.6076E+14	36.55	0.0010		Adj R sq	83.08%	
Residual error	6	2.6388E+13	4.3980E+12						
Total	7	1.8714E+14							
	FY	FY Total Command Obs	EGLIN	Fit	SE Fit	Residual	St Resid	% var	Abs Var
	2001	$82,864,244	$3,474,564	$4,996,298	$826,411	-$1,521,734	-0.79	-43.80%	43.80%
	2002	$73,131,719	$3,566,075	$4,409,476	$729,348	-$843,401	-0.43	-23.65%	23.65%
	2003	$82,622,624	$4,070,858	$4,981,730	$824,002	-$910,871	-0.47	-22.38%	22.38%
	2004	$78,743,748	$3,931,042	$4,747,853	$785,317	-$816,811	-0.42	-20.78%	20.78%
	2005	$76,269,048	$9,182,835	$4,598,641	$760,637	$4,584,194	2.35R	49.92%	49.92%
	2006	$81,757,504	$5,423,197	$4,929,567	$815,374	$493,629	0.26	9.10%	9.10%
	2007	$80,468,442	$4,073,451	$4,851,843	$802,518	-$778,392	-0.40	-19.11%	19.11%
			$4,817,432					-10.10%	26.96%

APPENDIX A
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REGRESSION ANALYSIS

HANSCOM		The regression equation is	Hanscom = .159FY Total						
Predictor		Coef	SE Coef	T	P				
FY	Total	0.15854	0.005233	30.3	0.0000				
S	=	$1,100,426							
		Analysis of Variance							
Source	DF	SS	MS	F	P		R sq	99.35%	
Regression	1	1.1114E+15	1.1114E+15	917.82	0.0000		Adj R sq	99.22%	
Residual error	6	7.2656E+12	1.2109E+12						
Total	7	1.1187E+15							
	FY	FY Total Command Obs	HANSCOM	Fit	SE Fit	Residual	St Resid	% var	Abs Var
	2001	$82,864,244	$14,312,093	$13,137,288	$433,638	$1,174,805	1.16	8.21%	8.21%
	2002	$73,131,719	$10,371,495	$11,594,294	$382,706	-$1,222,799	-1.19	-11.79%	11.79%
	2003	$82,622,624	$14,385,392	$13,098,981	$432,373	$1,286,411	1.27	8.94%	8.94%
	2004	$78,743,748	$12,315,308	$12,484,025	$412,075	-$168,716	-0.17	-1.37%	1.37%
	2005	$76,269,048	$10,673,987	$12,091,686	$399,124	-$1,417,698	-1.38	-13.28%	13.28%
	2006	$81,757,504	$13,590,549	$12,961,825	$427,846	$628,724	0.62	4.63%	4.63%
	2007	$80,468,442	$12,208,153	$12,757,457	$421,100	-$549,304	-0.54	-4.50%	4.50%
			$12,550,997					-1.31%	7.53%

APPENDIX A
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REGRESSION ANALYSIS

HILL		The regression equation is	Hill = .0766FY Total						
Predictor		Coef	SE Coef	T	P				
FY	Total	0.07664	0.01005	7.63	0.0000				
S	=	$2,112,940							
		Analysis of Variance							
Source	DF	SS	MS	F	P		R sq	90.65%	
Regression	1	2.5975E+14	2.5975E+14	58.18	0.0000		Adj R sq	88.78%	
Residual error	6	2.6787E+13	4.4645E+12						
Total	7	2.8653E+14							
	FY	FY Total Command Obs	HILL	Fit	SE Fit	Residual	St Resid	% var	Abs Var
	2001	$82,864,244	$8,463,996	$6,350,972	$832,633	$2,113,025	1.09	24.96%	24.96%
	2002	$73,131,719	$8,888,370	$5,605,041	$734,839	$3,283,329	1.66	36.94%	36.94%
	2003	$82,622,624	$6,324,271	$6,332,453	$830,205	-$8,182	0.00	-0.13%	0.13%
	2004	$78,743,748	$6,438,999	$6,035,164	$791,230	$403,835	0.21	6.27%	6.27%
	2005	$76,269,048	$4,528,669	$5,845,495	$766,363	-$1,316,826	-0.67	-29.08%	29.08%
	2006	$81,757,504	$4,638,630	$6,266,148	$821,512	-$1,627,518	-0.84	-35.09%	35.09%
	2007	$80,468,442	$3,522,359	$6,167,350	$808,560	-$2,644,991	-1.35	-75.09%	75.09%
			$6,115,042					-10.17%	29.65%

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KIRTLAND		The regression equation is	Kirtland = ..136FY Total						
Predictor		Coef	SE Coef	T	P				
FY	Total	0.1356	0.01522	8.91	0.0000				
S	=	$3,201,000							
		Analysis of Variance							
Source	DF	SS	MS	F	P		R sq	92.97%	
Regression	1	8.1310E+14	8.1310E+14	79.35	0.0000		Adj R sq	91.56%	
Residual error	6	6.1478E+13	1.0246E+13						
Total	7	8.7458E+14							
	FY	FY Total Command Obs	KIRTLAND	Fit	SE Fit	Residual	St Resid	% var	Abs Var
	2001	$82,864,244	$11,907,544	$11,236,709	$1,261,398	$670,835	0.23	5.63%	5.63%
	2002	$73,131,719	$7,266,588	$9,916,942	$1,113,245	-$2,650,354	-0.88	-36.47%	36.47%
	2003	$82,622,624	$8,661,574	$11,203,945	$1,257,720	-$2,542,371	-0.86	-29.35%	29.35%
	2004	$78,743,748	$9,022,648	$10,677,954	$1,198,674	-$1,655,306	-0.56	-18.35%	18.35%
	2005	$76,269,048	$10,576,981	$10,342,376	$1,161,003	$234,606	0.08	2.22%	2.22%
	2006	$81,757,504	$10,196,922	$11,086,631	$1,244,551	-$889,710	-0.30	-8.73%	8.73%
	2007	$80,468,442	$17,541,588	$10,911,830	$1,224,928	$6,629,758	2.24R	37.79%	37.79%
			$10,739,121					-6.75%	19.79%

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ROBINS		The regression equation is	Robins = .0804FY Total						
Predictor		Coef	SE Coef	T	P				
FY	Total	0.080429	0.006117	13.15	0.0000				
S	=	$1,286,327							
		Analysis of Variance							
Source	DF	SS	MS	F	P		R sq	96.65%	
Regression	1	2.8604E+14	2.8604E+14	172.87	0.0000		Adj R sq	95.97%	
Residual error	6	9.9278E+12	1.6546E+12						
Total	7	2.9597E+14							
	FY	FY Total Command Obs	ROBINS	Fit	SE Fit	Residual	St Resid	% var	Abs Var
	2001	$82,864,244	$5,428,764	$6,664,671	$506,895	-$1,235,908	-1.05	-22.77%	22.77%
	2002	$73,131,719	$5,869,467	$5,881,896	$447,359	-$12,429	-0.01	-0.21%	0.21%
	2003	$82,622,624	$6,188,002	$6,645,238	$505,417	$457,236	-0.39	-7.39%	7.39%
	2004	$78,743,748	$6,167,683	$6,333,265	$481,689	-$165,582	-0.14	-2.68%	2.68%
	2005	$76,269,048	$8,442,810	$6,134,228	$466,551	$2,308,582	1.93	27.34%	27.34%
	2006	$81,757,504	$7,612,652	$6,575,658	$500,125	$1,036,995	0.88	13.62%	13.62%
	2007	$80,468,442	$5,145,778	$6,471,980	$492,239	-$1,326,202	-1.12	-25.77%	25.77%
			$6,407,879					-2.55%	14.26%

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TINKER		The regression equation is	Tinker = .132FY Total						
Predictor		Coef	SE Coef	T	P				
FY	Total	0.131761	0.007676	17.16	0.0000				
S	=	$1,614,169							
		Analysis of Variance							
Source	DF	SS	MS	F	P		R sq	98.00%	
Regression	1	7.6767E+14	7.6767E+14	294.63	0.0000		Adj R sq	97.61%	
Residual error	6	1.5633E+13	2.6055E+12						
Total	7	7.8331E+14							
	FY	FY Total Command Obs	TINKER	Fit	SE Fit	Residual	St Resid	% var	Abs Var
	2001	$82,864,244	$8,825,774	$10,918,291	$636,086	-$2,092,517	-1.41	-23.71%	23.71%
	2002	$73,131,719	$7,739,694	$9,635,922	$561,376	-$1,896,227	-1.25	-24.50%	24.50%
	2003	$82,622,624	$12,792,409	$10,886,455	$634,231	$1,905,955	1.28	14.90%	14.90%
	2004	$78,743,748	$11,767,665	$10,375,369	$604,456	$1,392,296	0.93	11.83%	11.83%
	2005	$76,269,048	$11,282,178	$10,049,300	$585,459	$1,232,878	0.82	10.93%	10.93%
	2006	$81,757,504	$10,032,444	$10,772,465	$627,590	-$740,021	-0.50	-7.38%	7.38%
	2007	$80,468,442	$10,744,679	$10,602,617	$617,695	$142,062	0.10	1.32%	1.32%
			$10,454,978					-2.37%	13.51%

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WPAFB		The regression equation is	WPAFB = .239FY Total						
Predictor		Coef	SE Coef	T	P				
FY Total		0.239162	0.007408	32.28	0.0000				
S	=	$1,557,777							
		Analysis of Variance							
Source	DF	SS	MS	F	P		R sq	99.43%	
Regression	1	2.5292E+15	2.5292E+15	1042.26	0.0000		Adj R sq	99.31%	
Residual error	6	1.4560E+13	2.4267E+12						
Total	7	2.5438E+15							
	FY	FY Total Command Obs	WPAFB	Fit	SE Fit	Residual	St Resid	% var	Abs Var
	2001	$82,864,244	$20,753,176	$19,818,001	$613,863	$935,176	0.65	4.51%	4.51%
	2002	$73,131,719	$18,837,024	$17,490,348	$541,764	$1,346,677	0.92	7.15%	7.15%
	2003	$82,622,624	$20,099,713	$19,760,214	$612,073	$339,499	0.24	1.69%	1.69%
	2004	$78,743,748	$18,411,217	$18,832,533	$583,338	-$421,316	-0.29	-2.29%	2.29%
	2005	$76,269,048	$15,182,704	$18,240,678	$565,006	-$3,057,974	-2.11R	-20.14%	20.14%
	2006	$81,757,504	$20,915,929	$19,553,310	$605,664	$1,362,619	0.95	6.51%	6.51%
	2007	$80,468,442	$18,635,742	$19,245,015	$596,115	-$609,273	-0.42	-3.27%	3.27%
			$18,976,501					-0.83%	6.51%

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BROOKS		The regression equation is			Brooks = .0451FY Total				
Predictor		Coef	SE Coef	T	P				
FY Total		0.045104	0.007837	5.76	0.0010				
S	=	$3,274,685							
		Analysis of variance							
Source	DF	SS	MS	F	P		R sq	84.66%	
Regression	1	3.5518E+14	3.5518E+14	33.12	0.0010		Adj R Sq	81.60%	
Residual error	6	6.4341E+13	1.0724E+13						
Total	7	4.1952E+14							
	FY	FY Total Command Obs	BROOKS	Fit	SE Fit	Residual	St Resid	% Var	Abs Var
	2001	$146,557,427	$10,868,190	$6,610,320	$1,148,596	$4,257,870	1.39	39.18%	39.18%
	2002	$144,446,836	$7,706,480	$6,515,124	$1,132,055	$1,191,357	0.39	15.46%	15.46%
	2003	$172,197,899	$10,998,731	$7,766,806	$1,349,545	$3,231,925	1.08	29.38%	29.38%
	2004	$179,515,350	$9,022,777	$8,096,852	$1,406,893	$925,925	0.31	10.26%	10.26%
	2005	$169,279,917	$4,627,201	$7,635,194	$1,326,676	-$3,007,993	-1.00	-65.01%	65.01%
	2006	$150,666,007	$3,183,465	$6,795,633	$1,180,796	-$3,612,168	-1.18	-113.47%	113.47%
	2007	$137,885,485	$2,843,663	$6,219,181	$1,080,633	-$3,375,518	-1.09	-118.70%	118.70%
			$7,035,787					-28.98%	55.92%

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EDWARDS		The regression equation is			Edwards = ..13FY Total				
Predictor		Coef	SE Coef	T	P				
FY Total		0.129626	0.007484	17.32	0.0000				
S	=	$3,127,309							
		Analysis of variance							
Source	DF	SS	MS	F	P		R sq	98.04%	
Regression	1	2.9336E+15	2.9336E+15	299.96	0.0000		Adj R Sq	97.65%	
Residual error	6	5.8680E+13	9.7801E+12						
Total	7	2.9923E+15							
	FY	FY Total Command Obs	EDWARDS	Fit	SE Fit	Residual	St Resid	% Var	Abs Var
	2001	$146,557,427	$19,020,377	$18,997,655	$1,096,904	$22,722	0.01	0.12%	0.12%
	2002	$144,446,836	$20,557,625	$18,724,068	$1,081,108	$1,833,557	0.62	8.92%	8.92%
	2003	$172,197,899	$22,083,962	$22,321,328	$1,288,810	-$237,366	-0.08	-1.07%	1.07%
	2004	$179,515,350	$19,796,426	$23,269,860	$1,343,577	-$3,473,434	-1.23	-17.55%	17.55%
	2005	$169,279,917	$20,317,724	$21,943,081	$1,266,970	-$1,625,357	-0.57	-8.00%	8.00%
	2006	$150,666,007	$18,272,875	$19,530,234	$1,127,655	-$1,257,359	-0.43	-6.88%	6.88%
	2007	$137,885,485	$24,116,470	$17,873,546	$1,031,999	$6,242,924	2.11R	25.89%	25.89%
			$20,595,066					0.20%	9.78%

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EGLIN		The regression equation is			Eglin = .112FY Total				
Predictor		Coef	SE Coef	T	P				
FY Total		0.111791	0.006933	16.12	0.0000				
S	=	$2,896,893							
		Analysis of variance							
Source	DF	SS	MS	F	P		R sq	97.74%	
Regression	1	2.1819E+15	2.1819E+15	260.00	0.0000		Adj R Sq	97.29%	
Residual error	6	5.0352E+13	8.3920E+12						
Total	7	2.2323E+15							
	FY	FY Total Command Obs	EGLIN	Fit	SE Fit	Residual	St Resid	% Var	Abs Var
	2001	$146,557,427	$13,135,876	$16,383,861	$1,016,086	-$3,247,985	-1.2	-24.73%	24.73%
	2002	$144,446,836	$12,342,052	$16,147,915	$1,001,453	-$3,805,862	-1.4	-30.84%	30.84%
	2003	$172,197,899	$18,176,467	$19,250,245	$1,193,852	-$1,073,778	-0.41	-5.91%	5.91%
	2004	$179,515,350	$22,997,102	$20,068,273	$1,244,584	$2,928,829	1.12	12.74%	12.74%
	2005	$169,279,917	$22,687,108	$18,924,040	$1,173,621	$3,763,068	1.42	16.59%	16.59%
	2006	$150,666,007	$16,225,534	$16,843,164	$1,044,571	-$617,631	-0.23	-3.81%	3.81%
	2007	$137,885,485	$16,436,548	$15,414,412	$955,963	$1,022,136	0.37	6.22%	6.22%
			$17,428,670					-4.25%	14.40%

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HANSCOM		The regression equation is			Hanscom = .0464FY Total				
Predictor		Coef	SE Coef	T	P				
FY Total		0.046395	0.00162	28.64	0.0000				
S	=	$676,903							
		Analysis of variance							
Source	DF	SS	MS	F	P		R sq	99.27%	
Regression	1	3.7580E+14	3.7580E+14	820.18	0.0000		Adj R Sq	99.13%	
Residual error	6	2.7492E+12	4.5820E+11						
Total	7	3.7855E+14							
	FY	FY Total Command Obs	HANSCOM	Fit	SE Fit	Residual	St Resid	% Var	Abs Var
	2001	$146,557,427	$7,356,320	$6,799,527	$237,424	$556,793	0.88	7.57%	7.57%
	2002	$144,446,836	$7,517,032	$6,701,606	$234,005	$815,426	1.28	10.85%	10.85%
	2003	$172,197,899	$7,644,803	$7,989,116	$278,962	-$344,312	-0.56	-4.50%	4.50%
	2004	$179,515,350	$7,914,349	$8,328,609	$290,816	-$414,260	-0.68	-5.23%	5.23%
	2005	$169,279,917	$6,801,793	$7,853,736	$274,234	-$1,051,943	-1.7	-15.47%	15.47%
	2006	$150,666,007	$7,580,741	$6,990,144	$244,080	$590,597	0.94	7.79%	7.79%
	2007	$137,885,485	$6,566,595	$6,397,192	$223,375	$169,402	0.27	2.58%	2.58%
			$7,340,233					0.51%	7.71%

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HILL		The regression equation is			Hill = .0776FY Total				
Predictor		Coef	SE Coef	T	P				
FY Total		0.077588	0.001129	68.75	0.0000				
S	=	$471,550							
		Analysis of variance							
Source	DF	SS	MS	F	P		R sq	99.87%	
Regression	1	1.0510E+15	1.0510E+15	4726.64	0.0000		Adj R Sq	99.85%	
Residual error	6	1.3342E+12	2.2236E+11						
Total	7	1.0524E+15							
	FY	FY Total Command Obs	HILL	Fit	SE Fit	Residual	St Resid	% Var	Abs Var
	2001	$146,557,427	$11,424,731	$11,371,079	$165,396	$53,651	0.12	0.47%	0.47%
	2002	$144,446,836	$11,088,607	$11,207,323	$163,014	-$118,716	-0.27	-1.07%	1.07%
	2003	$172,197,899	$14,128,718	$13,360,469	$194,332	$768,249	1.79	5.44%	5.44%
	2004	$179,515,350	$13,529,212	$13,928,214	$202,590	-$399,003	-0.94	-2.95%	2.95%
	2005	$169,279,917	$12,450,910	$13,134,069	$191,039	-$683,159	-1.58	-5.49%	5.49%
	2006	$150,666,007	$11,952,566	$11,689,855	$170,033	$262,711	0.6	2.20%	2.20%
	2007	$137,885,485	$10,877,265	$10,698,242	$155,609	$179,024	0.4	1.65%	1.65%
			$12,207,430					0.03%	2.75%

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KIRTLAND		The regression equation is			Kirtland = .0867FY Total				
Predictor		Coef	SE Coef	T	P				
FY Total		0.086673	0.001294	66.99	0.0000				
S	=	$540,650							
		Analysis of variance							
Source	DF	SS	MS	F	P		R sq	99.87%	
Regression	1	1.3116E+15	1.3116E+15	4486.99	0.0000		Adj R Sq	99.84%	
Residual error	6	1.7538E+12	2.9230E+11						
Total	7	1.3133E+15							
	FY	FY Total	KIRTLAND	Fit	SE Fit	Residual	St Resid	% Var	Abs Var
	2001	$146,557,427	$12,926,093	$12,702,568	$189,633	$223,525	0.44	1.73%	1.73%
	2002	$144,446,836	$12,985,686	$12,519,637	$186,902	$466,049	0.92	3.59%	3.59%
	2003	$172,197,899	$15,282,828	$14,924,905	$222,810	$357,924	0.73	2.34%	2.34%
	2004	$179,515,350	$14,783,738	$15,559,130	$232,278	-$775,392	-1.59	-5.24%	5.24%
	2005	$169,279,917	$14,886,846	$14,671,994	$219,034	$214,851	0.43	1.44%	1.44%
	2006	$150,666,007	$13,380,987	$13,058,671	$194,949	$322,316	0.64	2.41%	2.41%
	2007	$137,885,485	$11,171,679	$11,950,945	$178,412	-$779,267	-1.53	-6.98%	6.98%
			$13,631,122					-0.10%	3.39%

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ROBINS		The regression equation is			Robins = .116FY Total				
Predictor		Coef	SE Coef	T	P				
FY Total		0.116479	0.003574	32.59	0.0000				
S	=	$1,493,462							
		Analysis of variance							
Source	DF	SS	MS	F	P		R sq	99.44%	
Regression	1	2.3687E+15	2.3687E+15	1062.00	0.0000		Adj R Sq	99.33%	
Residual error	6	1.3383E+13	2.2304E+12						
Total	7	2.3821E+15							
	FY	FY Total Command Obs	ROBINS	Fit	SE Fit	Residual	St Resid	% Var	Abs Var
	2001	$146,557,427	$15,512,252	$17,070,811	$523,832	-$1,558,559	-1.11	-10.05%	10.05%
	2002	$144,446,836	$16,763,957	$16,824,973	$516,288	-$61,016	-0.04	-0.36%	0.36%
	2003	$172,197,899	$23,098,504	$20,057,379	$615,478	$3,041,125	2.23R	13.17%	13.17%
	2004	$179,515,350	$19,891,787	$20,909,706	$641,632	-$1,017,919	-0.75	-5.12%	5.12%
	2005	$169,279,917	$18,961,568	$19,717,496	$605,048	-$755,928	-0.55	-3.99%	3.99%
	2006	$150,666,007	$17,827,473	$17,549,373	$538,517	$278,100	0.2	1.56%	1.56%
	2007	$137,885,485	$15,932,725	$16,060,715	$492,837	-$127,991	-0.09	-0.80%	0.80%
			$18,284,038					-0.80%	5.01%

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TINKER		The regression equation is			Tinker = .158FY Total				
Predictor		Coef	SE Coef	T	P				
FY Total		0.157572	0.008837	17.83	0.0000				
S	=	$3,692,475							
		Analysis of variance							
Source	DF	SS	MS	F	P		R sq	98.15%	
Regression	1	4.3349E+15	4.3349E+15	317.94	0.0000		Adj R Sq	97.78%	
Residual error	6	8.1806E+13	1.3634E+13						
Total	7	4.4167E+15							
	FY	FY Total Command Obs	TINKER	Fit	SE Fit	Residual	St Resid	% Var	Abs Var
	2001	$146,557,427	$29,150,767	$23,093,299	$1,295,136	$6,057,468	1.75	20.78%	20.78%
	2002	$144,446,836	$25,541,573	$22,760,730	$1,276,485	$2,780,843	0.8	10.89%	10.89%
	2003	$172,197,899	$24,001,371	$27,133,511	$1,521,723	-$3,132,140	-0.93	-13.05%	13.05%
	2004	$179,515,350	$23,131,553	$28,286,534	$1,586,387	-$5,154,981	-1.55	-22.29%	22.29%
	2005	$169,279,917	$26,805,035	$26,673,720	$1,495,936	$131,315	0.04	0.49%	0.49%
	2006	$150,666,007	$24,729,625	$23,740,695	$1,331,444	$988,930	0.29	4.00%	4.00%
	2007	$137,885,485	$21,756,350	$21,726,847	$1,218,502	$29,504	0.01	0.14%	0.14%
			$25,016,611					0.14%	10.23%

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WPAFB		The regression equation is			WPAFB = .229FY Total				
Predictor		Coef	SE Coef	T	P				
FY Total		0.22877	0.01161	19.71	0.0000				
S	=	$4,849,041							
		Analysis of variance							
Source	DF	SS	MS	F	P		R sq	98.48%	
Regression	1	9.1375E+15	9.1375E+15	388.61	0.0000		Adj R Sq	98.18%	
Residual error	6	1.4108E+14	2.3513E+13						
Total	7	9.2786E+15							
	FY	FY Total Command Obs	WPAFB	Fit	SE Fit	Residual	St Resid	% Var	Abs Var
	2001	$146,557,427	$27,162,821	$33,528,306	$1,700,802	-$6,365,485	-1.4	-23.43%	23.43%
	2002	$144,446,836	$29,943,824	$33,045,461	$1,676,308	-$3,101,638	-0.68	-10.36%	10.36%
	2003	$172,197,899	$36,782,515	$39,394,141	$1,998,360	-$2,611,626	-0.59	-7.10%	7.10%
	2004	$179,515,350	$48,448,407	$41,068,172	$2,083,279	$7,380,235	1.69	15.23%	15.23%
	2005	$169,279,917	$41,741,732	$38,726,587	$1,964,497	$3,015,145	0.68	7.22%	7.22%
	2006	$150,666,007	$37,512,741	$34,468,236	$1,748,482	$3,044,504	0.67	8.12%	8.12%
	2007	$137,885,485	$28,184,189	$31,544,405	$1,600,164	-$3,360,216	-0.73	-11.92%	11.92%
			$35,682,318					-3.18%	11.91%

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Air Force Institute of Technology
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14. ABSTRACT

The Department of Defense's Planning, Programming, Budgeting and Execution (PPBE) process provides the foundation for integrating mission requirements with limited resources. However, in doing so, it places a significant burden on financial management professionals frequently requiring that critical, skilled resources be occupied with creating documentation rather than in accomplishing higher level analysis. It is possible that models could be used within the PPBE process to streamline the work done to provide estimates of needed resources. However, such a model would be valid only if it could be proved that the data used within the model was suitable for such purposes. A nomothetic model could potentially be the modeling framework but only if the source data met the model's three criteria.

15. SUBJECT TERMS

PPBE, O&M, nomothetic model, programming, planning, budgeting, execution

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a. R	**b. ABSTRACT**	**c. THIS PAGE**			Dr. William Cunningham (ENS)
U	**U**	**U**	**UU**	63	**19b. TELEPHONE NUMBER** *(Include area code)* (937) 785-6565 x4283 William.Cunningham@afit.edu

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